



## **High-Voltage Split System**

**by Benjamin J. Showalter**

**ARL-TN-290**

**August 2007**

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# **Army Research Laboratory**

Aberdeen Proving Ground, MD 21005-5069

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## Contents

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<b>List of Figures</b>	<b>iv</b>
<b>1. Introduction</b>	<b>1</b>
<b>2. Procedures</b>	<b>1</b>
<b>3. Misfire</b>	<b>3</b>
<b>Distribution List</b>	<b>5</b>

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## List of Figures

---

Figure 1. FS-43 control unit.....	1
Figure 2. FS-43 firing module with “short to discharge” key or plug inserted. ....	2
Figure 3. RISI light box (TA-10B). ....	2
Figure 4. Schematic for high-voltage split system ARL transfer box. ....	4

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## 1. Introduction

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In accordance with Reynolds Industries Systems Incorporated (RISI), the purpose of the FS-43 control unit (figure 1) is to provide low-voltage electrical energy to the firing module and to ensure a safe and reliable operation sequence for the firing of exploding bridge wire (EBW) detonators.



Figure 1. FS-43 control unit.

The purpose of the FS-43 firing module, shown in figure 2, is to provide a significant amount of flexibility to this EBW detonator firing system. Since the firing pulse to function the EBW detonator must be applied at the proper rate of rise, or frequency, the firing module must be placed relatively close to the detonator. By being able to separate the firing module from the control unit, the operator can perform the detonation at extended distances as required by the size and characteristics of the main explosive charge.<sup>1</sup>

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## 2. Procedures

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The following procedures have been approved as a change to U.S. Army Research Laboratory (ARL) standard operating procedure (SOP) 385-008<sup>2</sup> and should only be used by certified personnel. SOPs must be followed at all times during experimental operations.

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<sup>1</sup><http://www.teledynersi.com> (accessed January 2007).

<sup>2</sup>ARL SOP 385-008. *Static Detonation of High Explosives at Outdoor Facilities*; U.S. Army Research Laboratory Safety Office: Aberdeen Proving Ground, MD, December 2000.

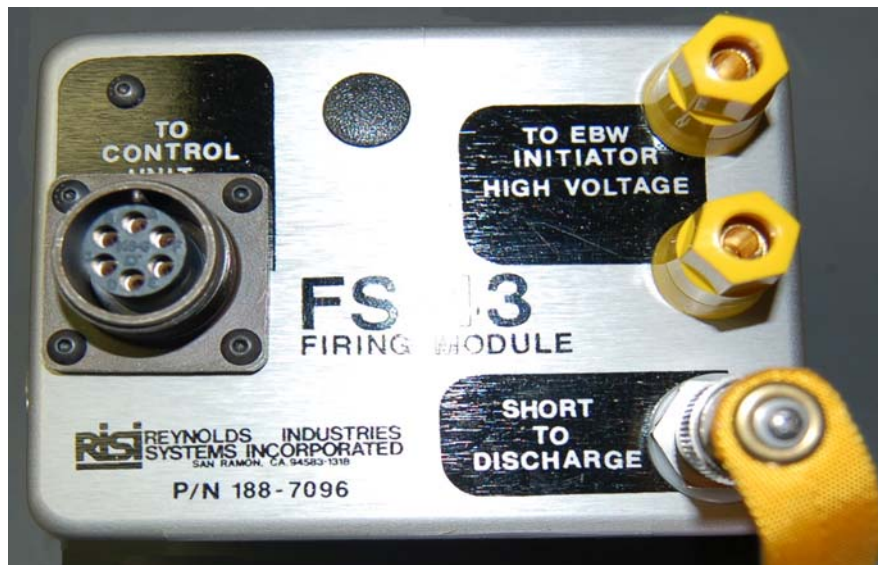


Figure 2. FS-43 firing module with “short to discharge” key or plug inserted.

When using the high-voltage split system, the test director and explosives operator will incorporate the following steps.

Prior to capping the charge, conduct a post-RISI light box (TA-10B shown in figure 3) test of firing line.



Figure 3. RISI light box (TA-10B).



1. Disconnect the low-voltage cable from the FS-43 control unit and plug it into a shorted connector and secure in the bombproof lock box.
2. Place the FS-43 firing module in the transfer box with the low-voltage cable attached. Connect the output connectors of the FS-43 firing module to the double-pole double-throw switch B (DPDTB).
3. Securely insert the “short to discharge” plug into the FS-43 firing module.
4. Verify the transfer box firing line leads are permanently attached to the DPDTB and are secured in the output connectors of the FS-43 firing module. Check to make sure the DPDTB, the double-pole double-throw switch A (DPDTA), and the single-pole single-throw switch (SPST) are in the safe (down/shorted) position. Also check that the “short to discharge” plug is secured in the FS-43 firing module. Lock the transfer box and proceed with capping the charge in accordance with ARL SOP 385-008.

After the charge has been capped:

1. Return to the transfer box; move the DPDTB switch to the fire (up) position.
2. Remove the “short to discharge” plug from the FS-43 firing module.
3. Move the DPDTA to the fire (up) position, move the SPST to the fire position (up), and secure the transfer box.
4. Return to the bombproof lock box and remove the low-voltage cable, connect it to the FS-43 control unit, and proceed with normal firing sequence as outlined in ARL SOP 385-008.

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### **3. Misfire**

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**CAUTION:** Follow these procedures after the second attempt to fire the charge has failed in accordance with ARL SOP 385-008.

1. Disconnect the low-voltage cable from the FS-43 control unit and plug it into a shorted connector and secure it in the bombproof lock box.
2. After the 30-min waiting period outlined in ARL SOP 385-008, return to the transfer box. Move the SPST to the safe (down) position.
3. Move the DPDTA to the safe (down) position.
4. Insert the “short to discharge” plug into the FS-43 firing module.

5. Move the DPDTB to the safe (down) position.
6. Secure the transfer box. Resume operations in accordance with ARL SOP 385-008.

The previous steps work in accordance with the schematic shown in figure 4.

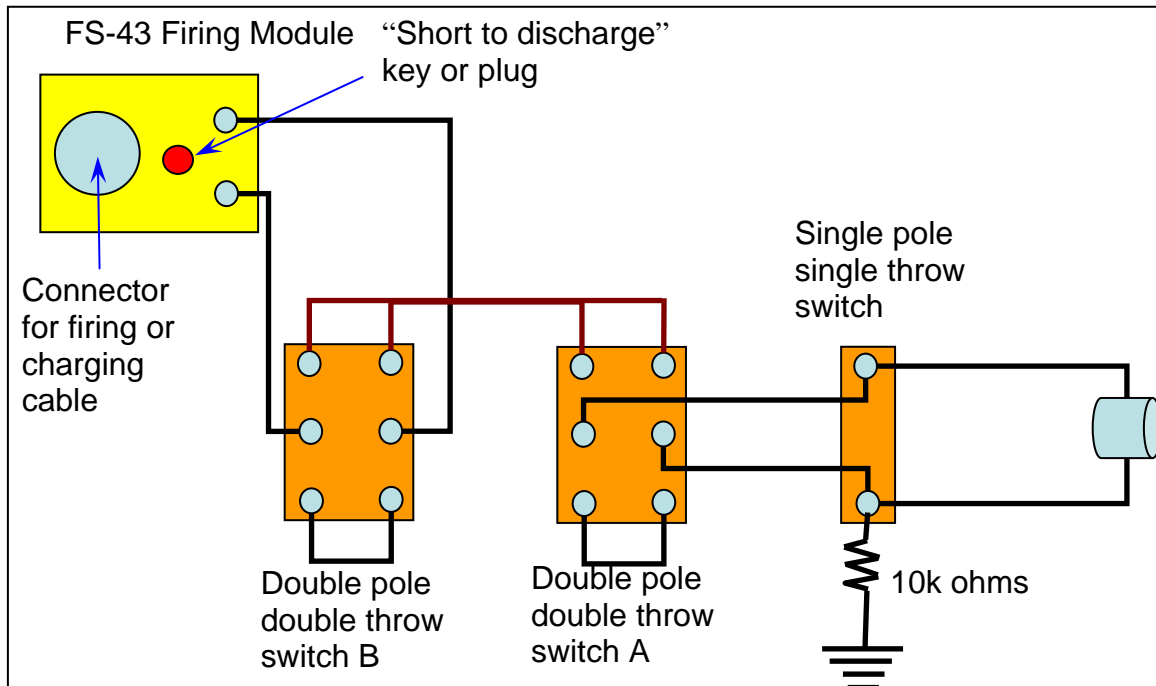


Figure 4. Schematic for high-voltage split system ARL transfer box.

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